



Studio Display (17" CRT, 16"
VIS, ADC

11 March 2003



Take Apart
Studio Display (17" CRT, 16" VIS,
ADC)



General Information

Safety Guidelines

Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety from the displays product area of rollover links on Service Source online.

Warning: Never use a grounding wriststrap until after discharging the CRT and setting up an ongoing ground connection.

Warning: When the rear housing is removed, avoid the sharp sheet-metal edges of the EMI shield, board chassis, and other metal areas of the display assembly.



Tools

The following tools are required:

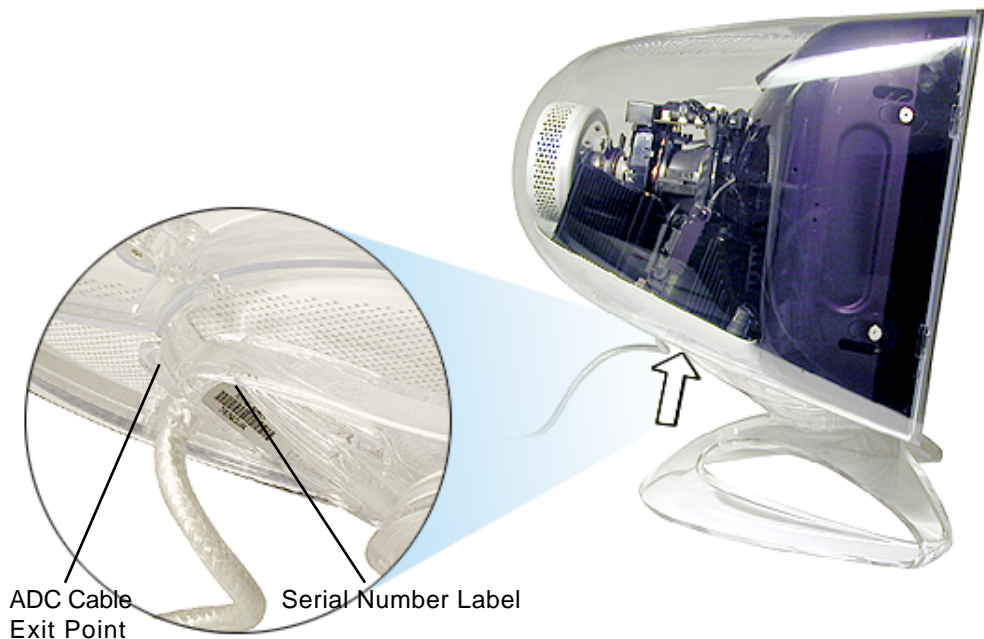
- Soft, clean towel on which to place the display face down
- Hex driver, 3/32 inch
- #2 Phillips screwdriver
- #1 Phillips screwdriver
- CRT discharge tool (076-0392)
- Small, plastic, flat-blade screwdriver
- Needlenose pliers
- Jeweler's screwdriver kit

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Serial Number Location

The serial number label on the Studio Display (17" CRT, 16" VIS, ADC) may be difficult to locate. To locate the serial number label:

1. Swivel the monitor so the display is tilted down, and you are facing the side of the monitor.
2. Position yourself so you are at eye level with the ADC cable exit point.
3. Locate the serial number label directly in front of the ADC cable exit point.



Protecting the Translucent Housing

Important: Because the housing of this monitor is made of translucent plastic, surface scratches can be more visible than on standard plastic housing. To avoid cosmetic damage and protect the housing during service procedures, please keep in mind the following precautions:

- Use a soft towel that is clean and free of debris whenever you service the display.
- Use caution working with metal tools to avoid scratching the housing.
- Before placing the display face on a towel, ensure the surface provides protection from scratches.



Monitor Stand

Note: The monitor stand is a customer-installable part and its replacement is covered by the Customer Installable Parts (CIP) program. The following replacement procedure is packed in-the-box with all replacement monitor stands.

Be sure to follow the instructions in this sheet carefully. Failure to follow these instructions could result in damage to your equipment and may void your warranty.

Replacing your monitor stand requires five basic steps:

- Turn off the computer and disconnect the display cable.
- Place the monitor upside down on a thick cloth.
- Remove the monitor stand.
- Install the replacement monitor stand.
- Place the monitor upright, connect the display cable, and restart the computer.

Note: Written and video instructions covering customer-installable parts are available at <http://www.info.apple.com/installparts/>.

Tools

Two jeweler's flat-blade screwdrivers are required for this procedure.

Note: If you do not have jeweler's screwdrivers, two long carpenter's nails can be used. However, the head of the nail must be at least 6 mm wide to prevent the nail from sliding into the enclosure.

Warning: If any tools or parts drop into the monitor, do not turn on the monitor. Contact Apple for further assistance. Never turn on your monitor unless all of its internal and external parts are in place and it is closed. Operating the monitor when it is open or missing parts can damage your monitor or cause injury.

Preliminary Steps

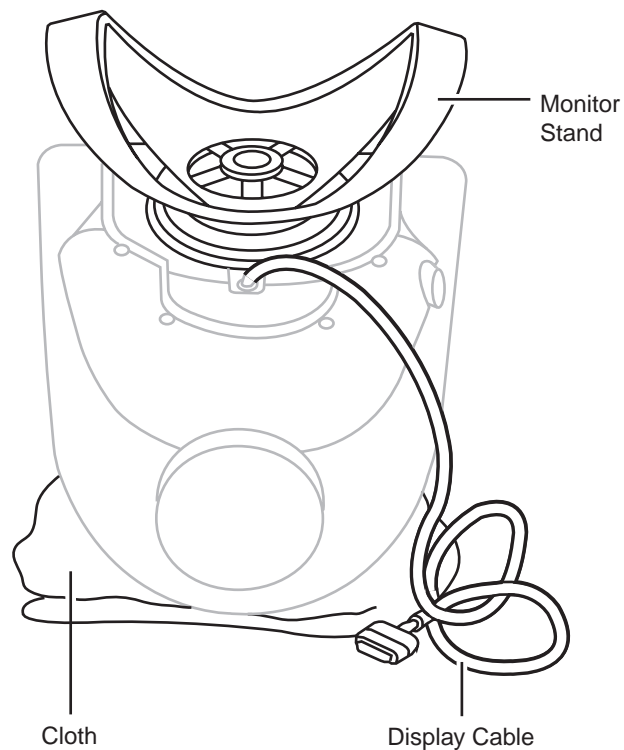
No preliminary steps are required before you begin this procedure.

Removing the Monitor Stand

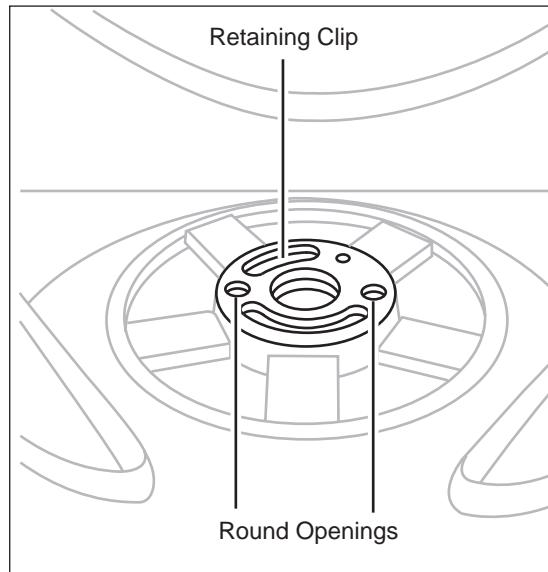
1. **Warning: Turn off your computer and disconnect the display cable as follows:**
 - Unplug the display cable from the computer.
 - Wait five minutes for the computer's internal components to cool down.
2. **Warning:** The monitor weighs 20 kg (45 pounds). Be careful when repositioning the monitor.

Use a thick, soft, clean cloth (such as a folded blanket or towel) as a cushion. Place the monitor upside down on the cloth so the screen is away from you and the monitor stand is in front of you.

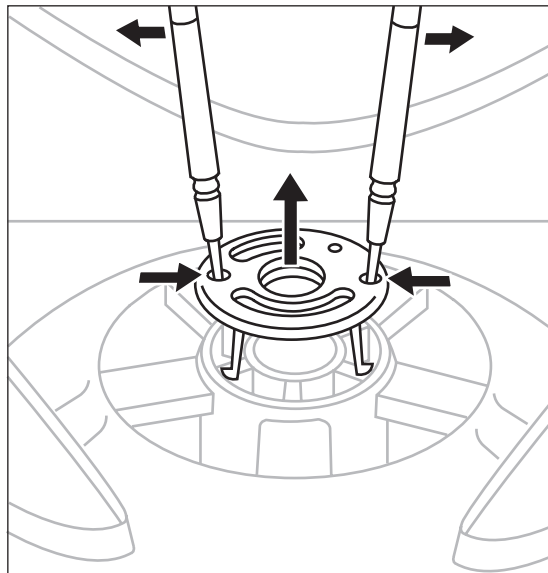
3. Slide the monitor stand toward the display cable.



4. In the center of the monitor stand, locate the two identical round openings in the retaining clip.

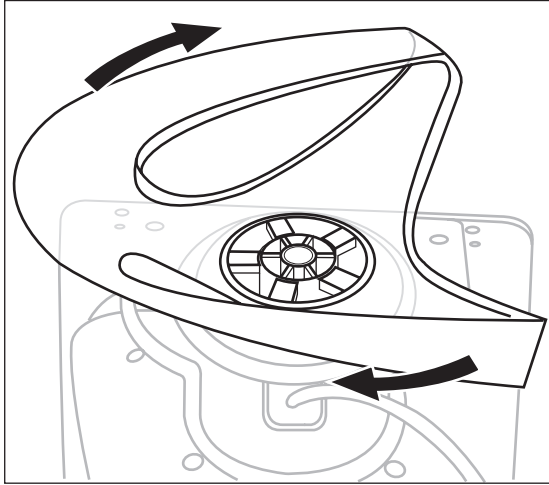


5. Using two jeweler's flat-blade screwdrivers, place one in each of the round openings and gently pry up the retaining clip until it is out of the monitor stand.

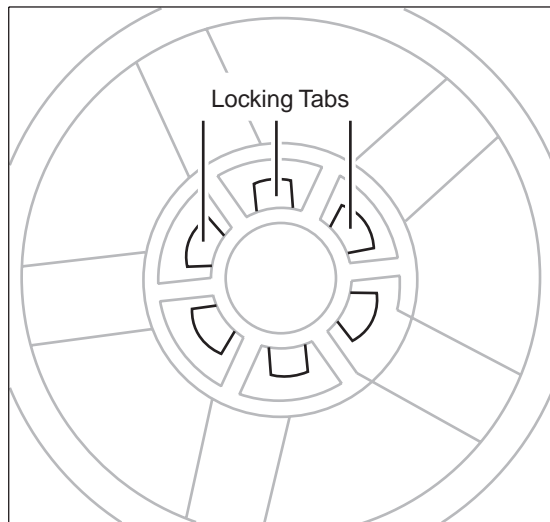


Warning: If any tools or parts drop into the monitor, do not turn on the monitor. Contact Apple for further assistance. Never turn on your monitor unless all of its internal and external parts are in place and it is closed. Operating the monitor when it is open or missing parts can damage your monitor or cause injury.

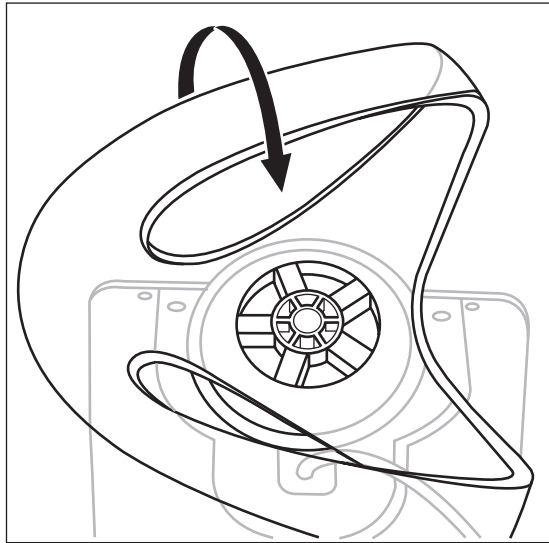
6. Rotate the stand clockwise (1/4 turn) so it is positioned as shown.



7. Peer into the center of the monitor stand and swivel it somewhat until you can see the locking tabs line up with the slots in the base.



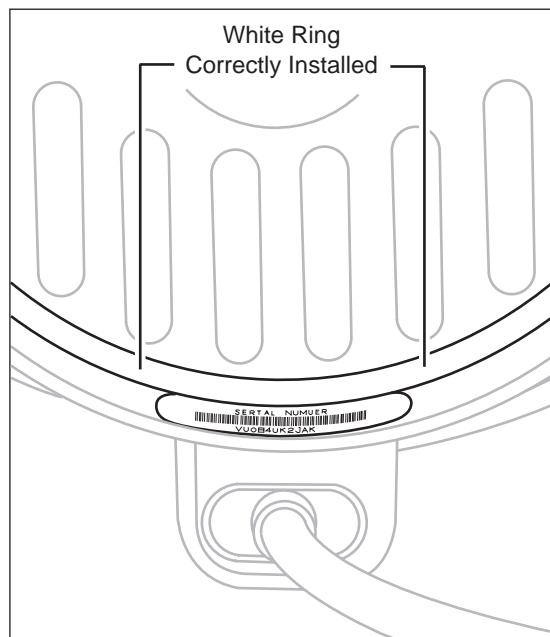
8. With the tabs aligned, gently pull the stand toward you. Then tilt the stand up off the base.



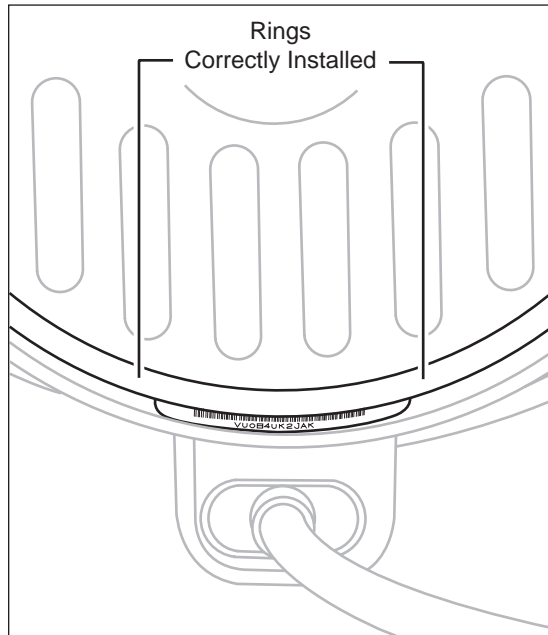
Positioning the Plastic Rings

After you remove the monitor stand, two plastic rings should remain on the base. These rings are fitted in a special orientation so the replacement stand will fit properly. However, if the rings are dislodged, replace them as follows:

1. Place the white plastic ring on the base so that you can still read the words "Serial Number" when the ring is slid all the way down. Turn the ring over if the words are not visible

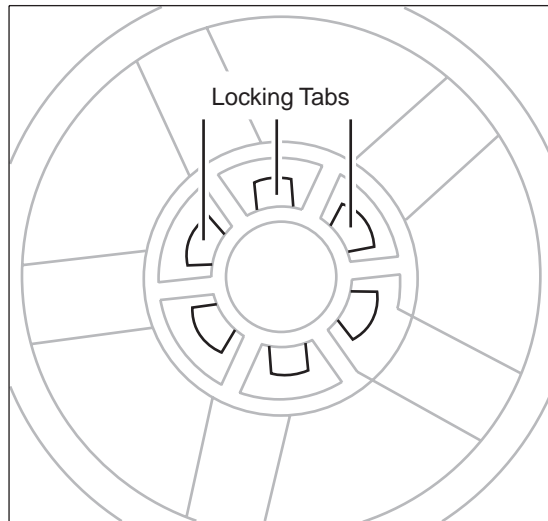


2. Place the clear plastic ring over the white ring so that the white ring fits inside the clear ring.
3. Check that the rings are properly aligned. They should easily slide in unison, and when they are close to the serial number label, you should be able to see the serial number bar code but not be able to clearly see the words "Serial Number."

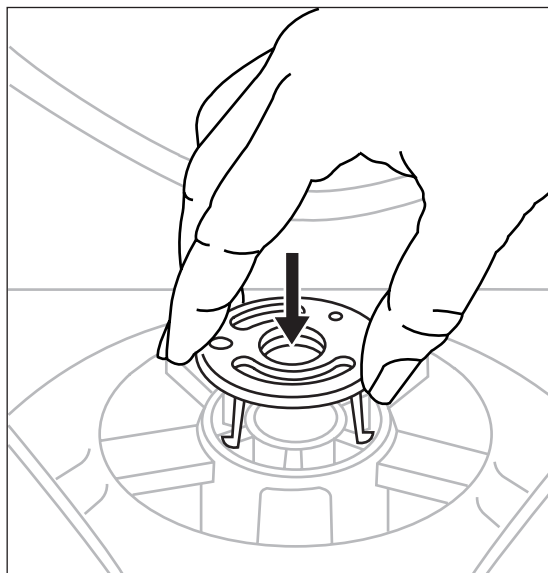


Installing the Replacement Monitor Stand

1. Holding the new monitor stand, align the slots in the center of the stand with the tabs on the base of the monitor.



2. Slide the stand up to engage the locking tabs.
3. Turn the stand counterclockwise.
4. Align the retaining clip and press it down until it clicks into place. The retaining clip is keyed and only fits one way.



5. Check that the stand slides easily.
6. Turn your monitor upright and reconnect it to the computer.

-
7. Restart your computer.

Warning: Never turn on your monitor unless all of its internal and external parts are in place and it is closed. Operating the monitor when it is open or missing parts can damage your monitor or cause injury.

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Remove Rear Housing

Tools

The following tools are required:

- Hex driver, 3/32 inch
- Small, plastic, flat-blade screwdriver
- #1 Phillips screwdriver
- Needlenose pliers
- Jeweler's screwdriver kit

Preliminary Steps

Before you begin, remove the monitor stand.

Procedure

1. Remove six hex screws from the rear housing.



2. Remove four short hex screws (1) and two longer hex screws (2) from the rear of the housing and the stand tilt base.



3. Locate the USB port. Use a small, plastic flat-blade screwdriver or needlenose pliers to peel off the USB label.



Replacement Note: Replace the USB label. The USB label should not be re-used because the adhesive may not hold the label properly.

4. Remove two screws and the plastic USB hub (1) from the USB port.



5. To remove the rear housing, use a plastic flat-blade screwdriver to push in locking tabs at six locations around the bottom of the rear housing.





Remove CRT Shroud

Tools

The following tool is required:

- #2 Phillips screwdriver

Preliminary Steps

Before you begin, remove the following:

- Monitor stand
- Rear housing

Procedure

1. Remove two screws from the CRT shroud.



2. Bow out slightly the bottom of the shroud and remove it from the CRT as shown.





Discharge the CRT and Remove Anode Cap

Tools

The following tools are required:

- CRT discharge tool (076-0392)

Preliminary Steps

Before you begin, remove the following:

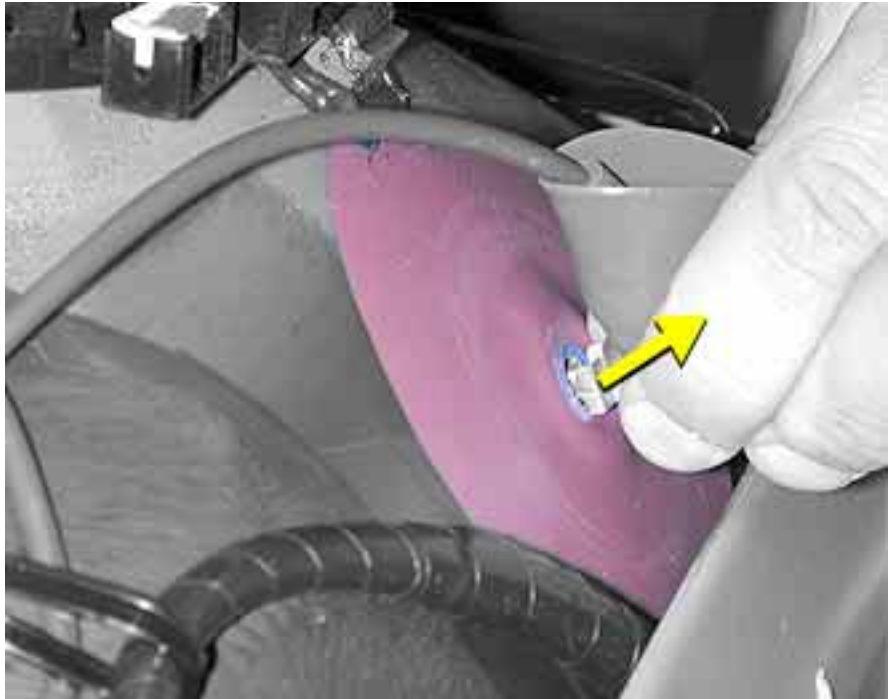
- Monitor stand
- Rear housing
- CRT shroud

Procedure

1. Attach the grounding clip of the CRT discharge tool to the metal frame of the CRT.
2. Insert the tip of the CRT discharge tool beneath the anode cap and make contact with the edge of the anode (anode aperture).

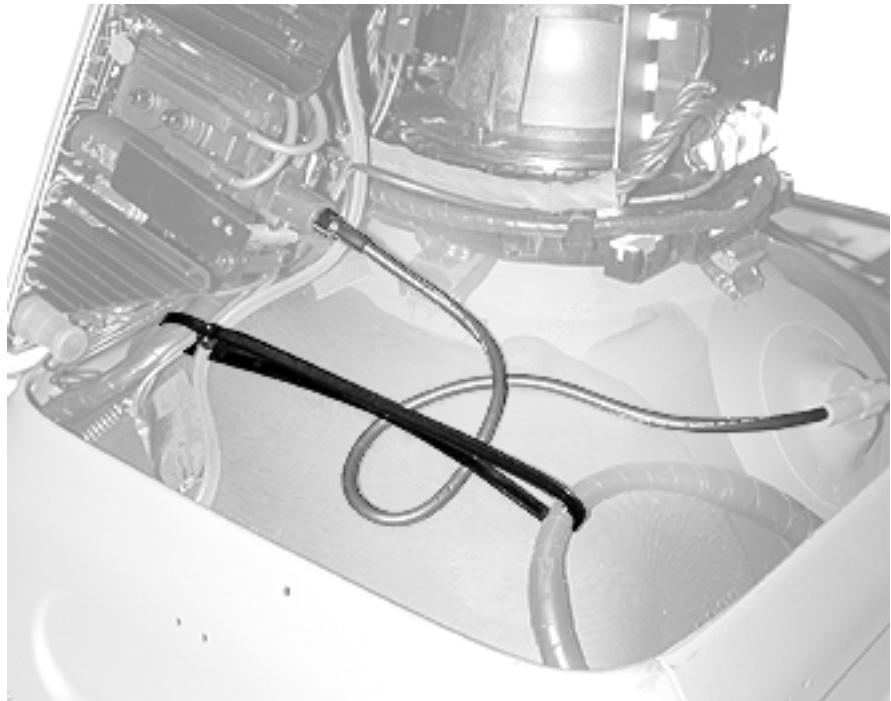


3. Fold up the anode cap, then squeeze together the metal clip to remove it from the internal edge of the anode aperture.



4. For working inside the monitor with the power off, establish an ongoing ground by using a cable with alligator clips at both ends. Connect one end to the anode aperture, and connect the other end to the metal CRT frame.
5. With the CRT discharged and the ongoing ground in place, wear a grounding wriststrap to prevent equipment damage from static electricity.

Replacement Note: When replacing the anode cable, secure it behind the tie wrap as shown in the photo below.





Deflection Board and Mount Assembly

Tools

The following tools are required:

- #2 Phillips screwdriver
- #1 Phillips screwdriver
- Small, plastic, flat-blade screwdriver
- Wire cutter
- Jeweler's screwdriver

Preliminary Steps

Before you begin, remove the following:

- Monitor stand
- Rear housing
- CRT shroud
- Discharge the CRT



Procedure

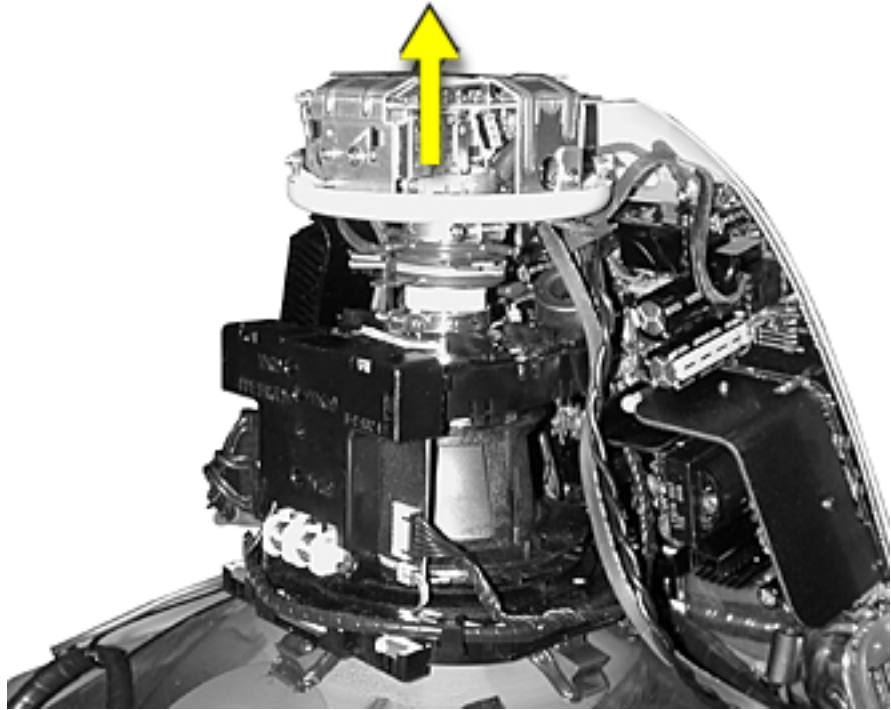
1. Using a jeweler's screwdriver, depress five plastic tabs while pulling up on the video can. Separate the video can from the video shield.



2. Use #2 Phillips screwdriver to loosen the neck clamp as shown below.

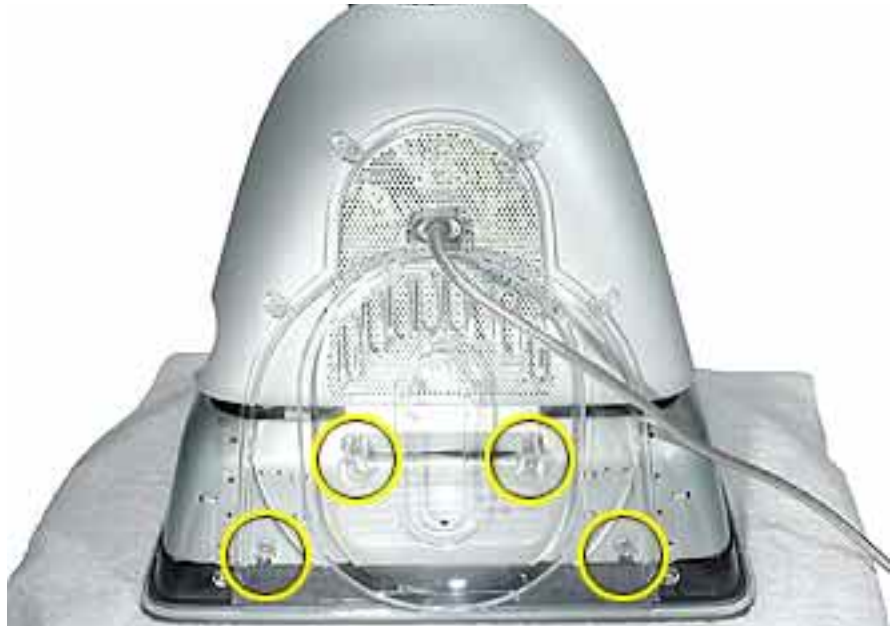


3. Pull the video assembly straight up and off the neck of the CRT.

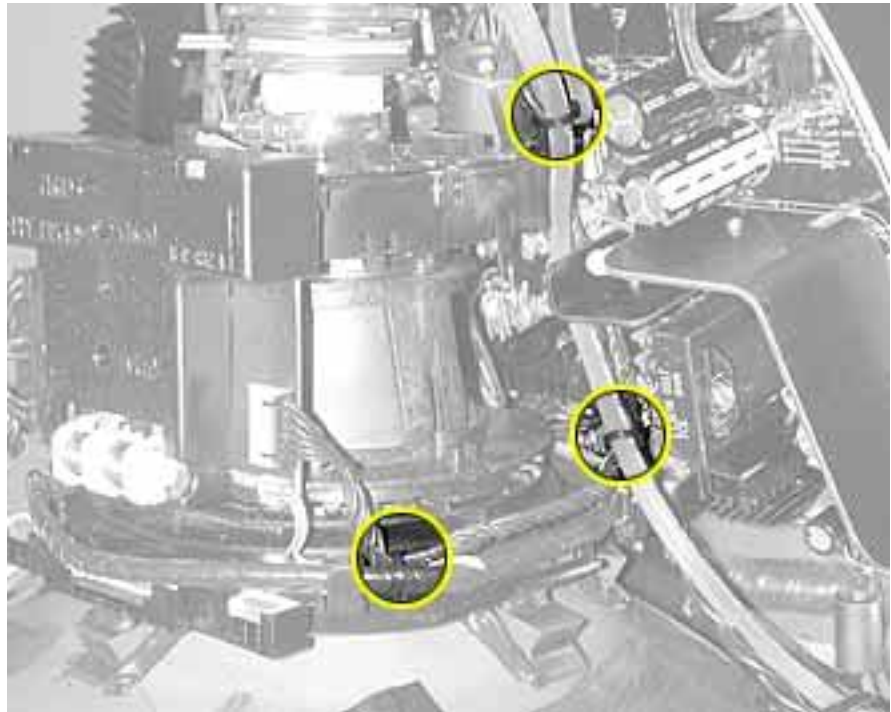


Replacement Note: Visually inspect the pins on the CRT and straighten any that are bent. Carefully align and position the video assembly connector on the neck of the CRT before pressing it down firmly.

4. Remove four screws from the stand tilt base.



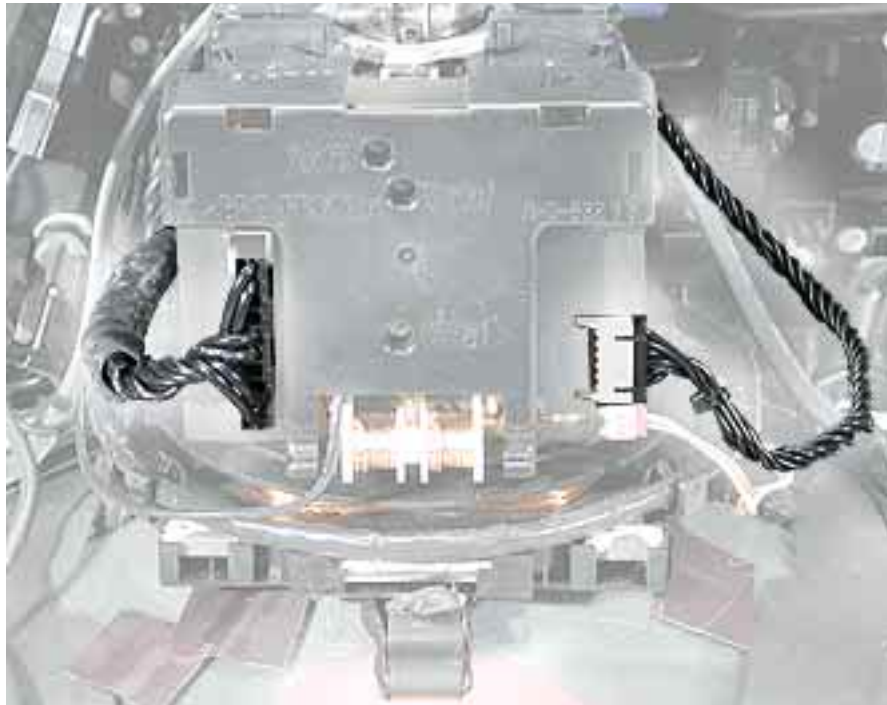
5. Use wire cutters to cut four tie wraps. The three tie wraps on right side of CRT neck are shown below; the fourth tie wrap is on the left side of the CRT neck.



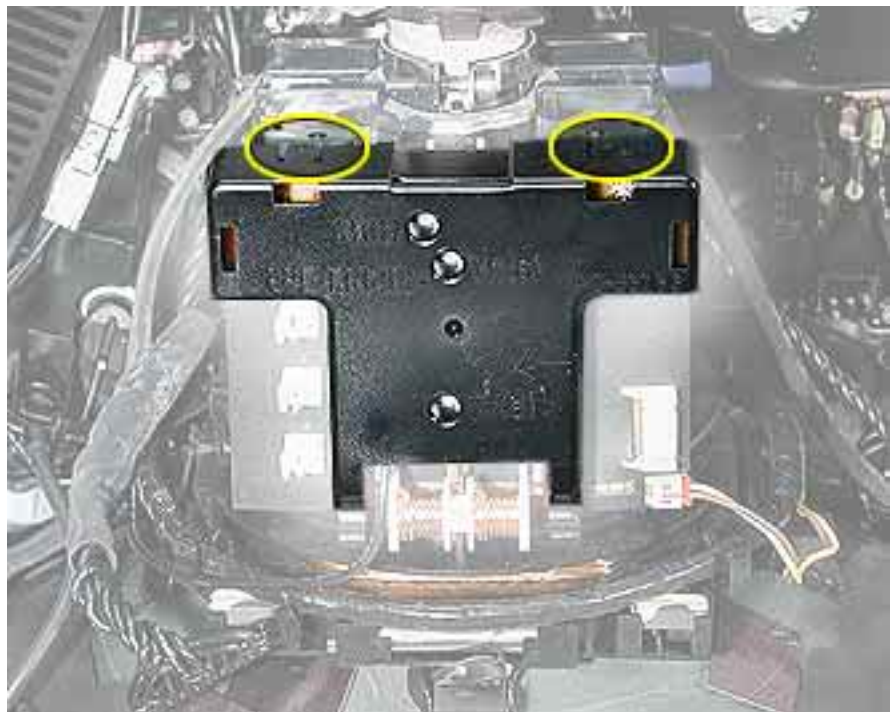
6. Disconnect the degauss cable from deflection board connector B981.



7. Disconnect two anode cables from connectors at the rear of the CRT/yoke board.



8. Using a small, plastic flat-blade screwdriver, release two tabs at the top of the CRT/yoke board cover and separate the cover from the CRT/yoke board.



9. Remove two screws and four ground cables from the the video shield.



10. Tilt back the entire deflection/mount assembly for better access in the following steps. Disconnect the CRT ground cable (1) and the control board cable (2) from connector B101.



11. Remove the deflection board and mount assembly from the CRT and place it on the workbench.



Replacement Note: When replacing the deflection board and mount assembly on the CRT, place the edge of the stand tilt base in the bezel channel as shown below.





Deflection Board Assembly

Tools

The following tools are required:

- #2 Phillips screwdriver
- #1 Phillips screwdriver
- Small, flat-blade screwdriver
- Jeweler's screwdriver
- Needlenose pliers

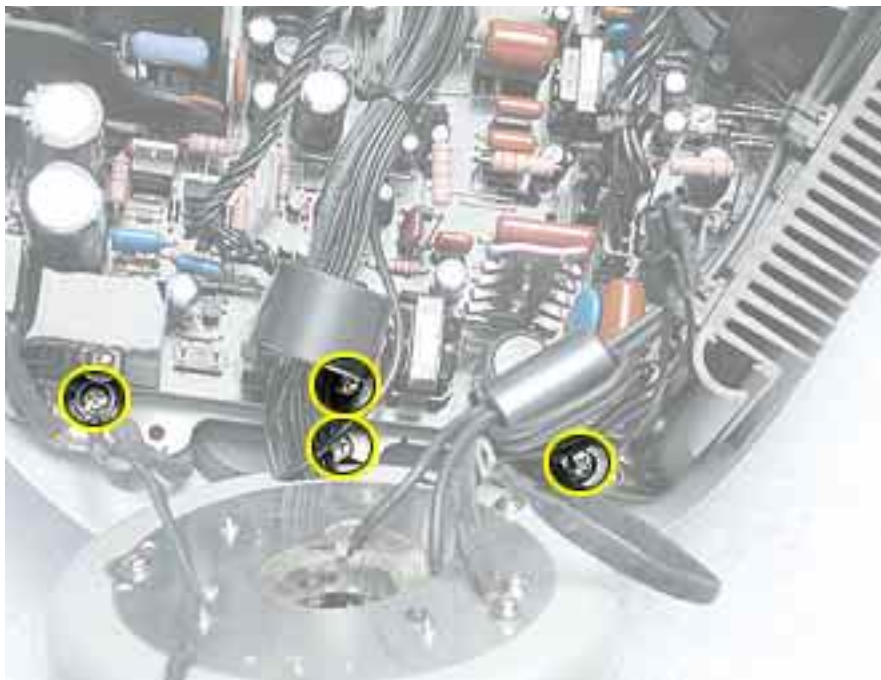
Preliminary Steps

Before you begin, remove the following:

- Monitor stand
- Rear housing
- CRT shroud
- Discharge the CRT
- Deflection board and mount assembly

Procedure

1. Remove four screws and two ground straps from the deflection board and PCB mount.



Replacement Note: Attach ground straps to the outside mounting screws, and attach a ground strap and clip to the lower, center mounting screw.

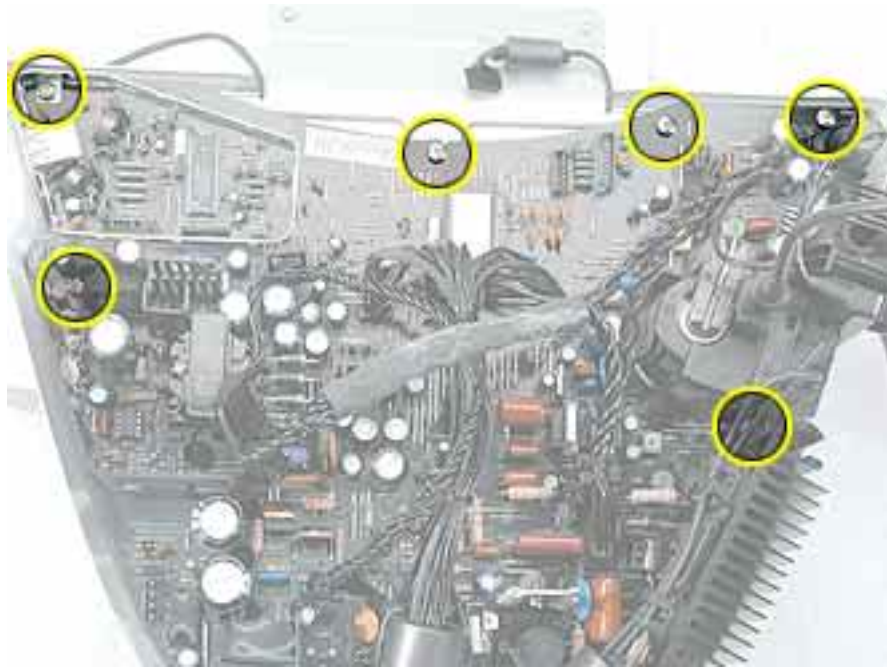
2. Disconnect these cables from the analog board:
 - USB cable from connector B103
 - LED cable from connector B105
 - Ground cable from connector B901



3. Use flat-tip screwdriver to pry off the metal USB shield.



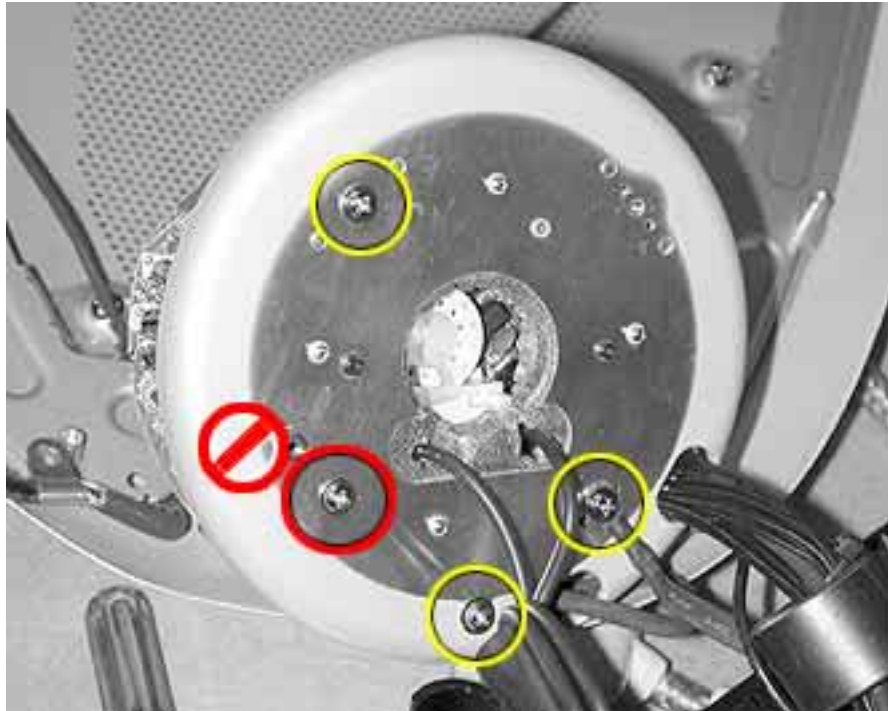
4. Remove the six remaining screws from the analog board and PCB mount.



5. Remove the analog board from the PCB mount and place it nearby on the workbench.
Caution: Note that video cables still connect the anode board and PCB mount.



6. Remove the screw and ground cable from the bottom of the video shield. Remove two of the remaining three screws as shown. **Note:** Do NOT remove the last screw, shown in red below.



7. **Replacement Note:** Note the position of the video cable and clip before performing the next step. You may need a needlenose pliers to replace the video cable.
8. Disconnect the video cable from connector B708. Pull apart the video holder and video shield enough to remove the video cable. Lace the video cable through the hole at the bottom of the video shield.





Video Cable

Tools

The following tools are required:

- #2 Phillips screwdriver

Preliminary Steps

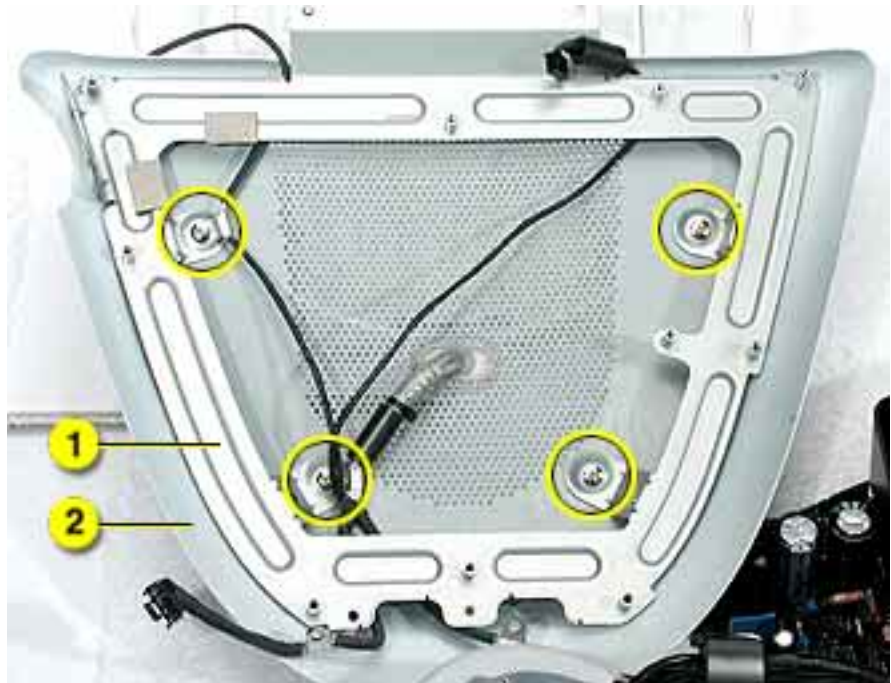
Before you begin, remove the following:

- Monitor stand
- Rear housing
- CRT shroud
- Discharge the CRT
- Deflection board and mount assembly
- Deflection board assembly

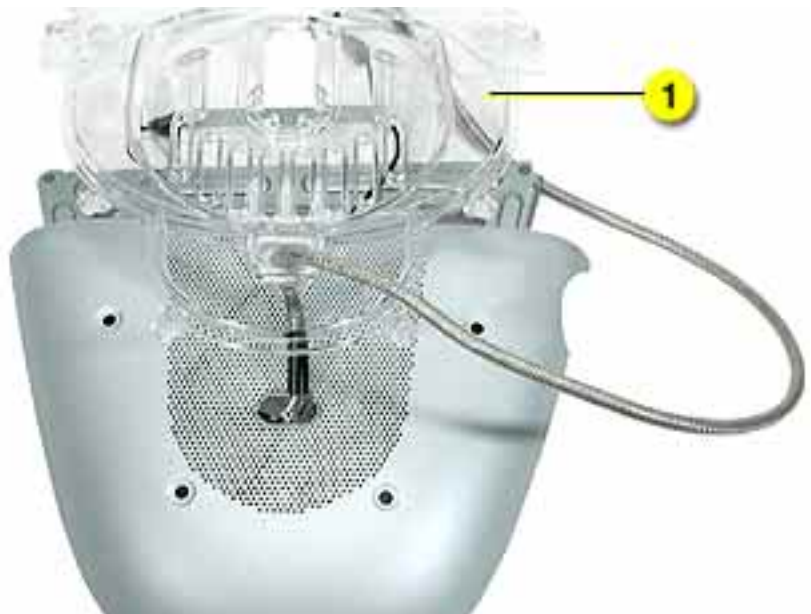
Procedure

Replacement Note: Note the positioning of the video cables before removing them from the PCB mount in the next step.

1. Remove four screws from the PCB mount, and remove the PCB mount (1) from the bottom pan (2).



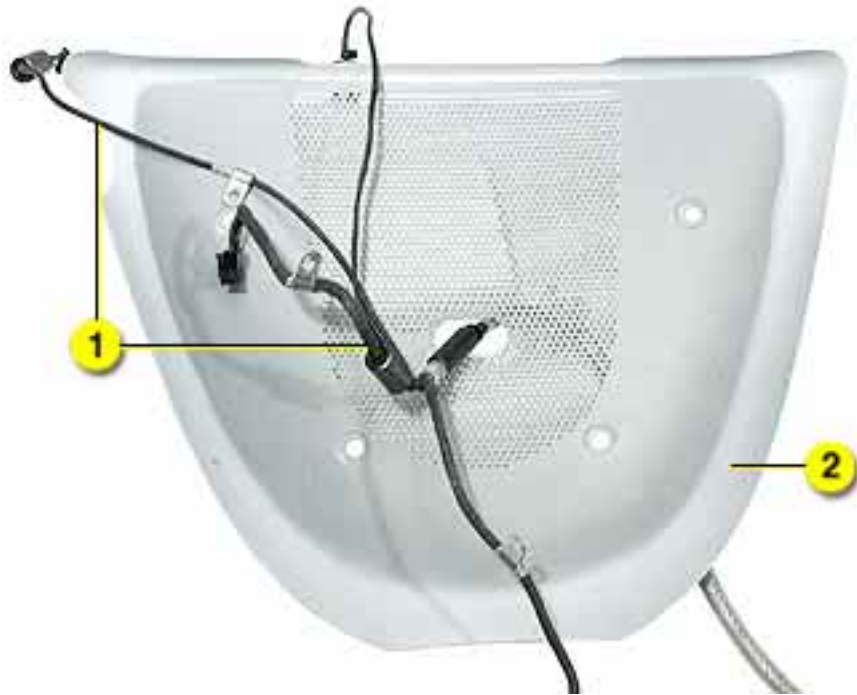
2. Turn over the bottom pan, and separate the stand tilt base (1) from the bottom pan.



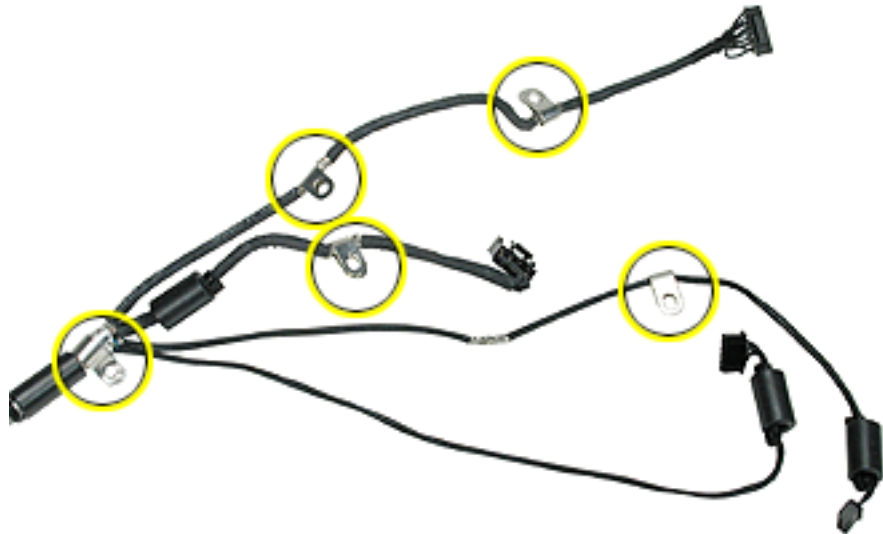
3. Pull the video cable off the bottom pan and pop open the plastic strain reliefs.



4. Lace the video cables (1) through the bottom pan (2).



Note: Remove five clips from the video cables before returning a faulty cable to Apple. Note the position of the clips in the photo below.





CRT

Tools

The following tools are required:

- #2 Phillips screwdriver
- #1 Phillips screwdriver

Preliminary Steps

Before you begin, remove the following:

- Monitor stand
- Rear housing
- CRT shroud
- Discharge the CRT
- Deflection board and mount assembly
- Deflection board assembly
- Video cable

Procedure

1. Remove four screws (1) from the metal degauss frame. Remove four more (black) screws (2) from bezel mount and degauss frame.



2. Lift slightly the bottom side of the degauss frame and disconnect the power button cable and the launch button cable. Remove the CRT from the front bezel assembly.





Front Bezel

Tools

The following tools are required:

- #1 Phillips screwdriver

Preliminary Steps

Before you begin, remove the following:

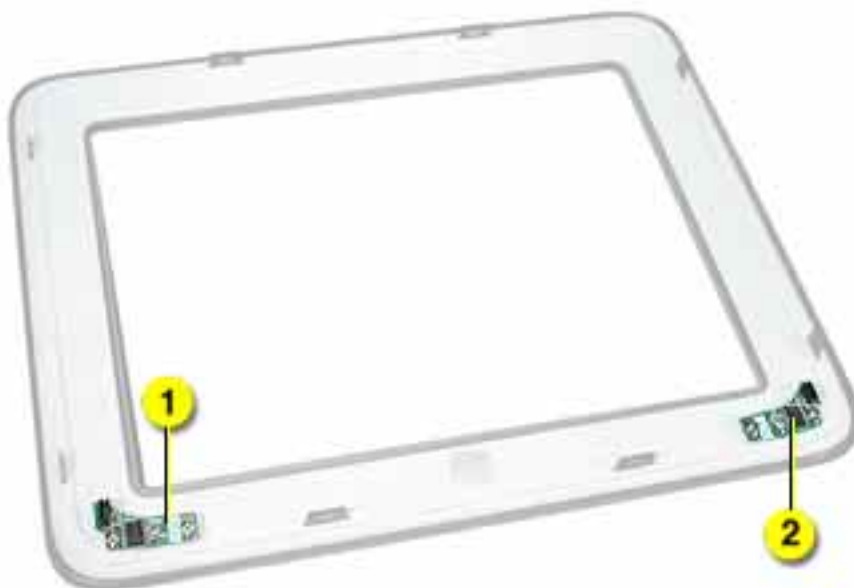
- Monitor stand
- Rear housing
- CRT shroud
- Discharge the CRT
- Deflection board and mount assembly
- Deflection board assembly
- Video cable
- CRT

Procedure

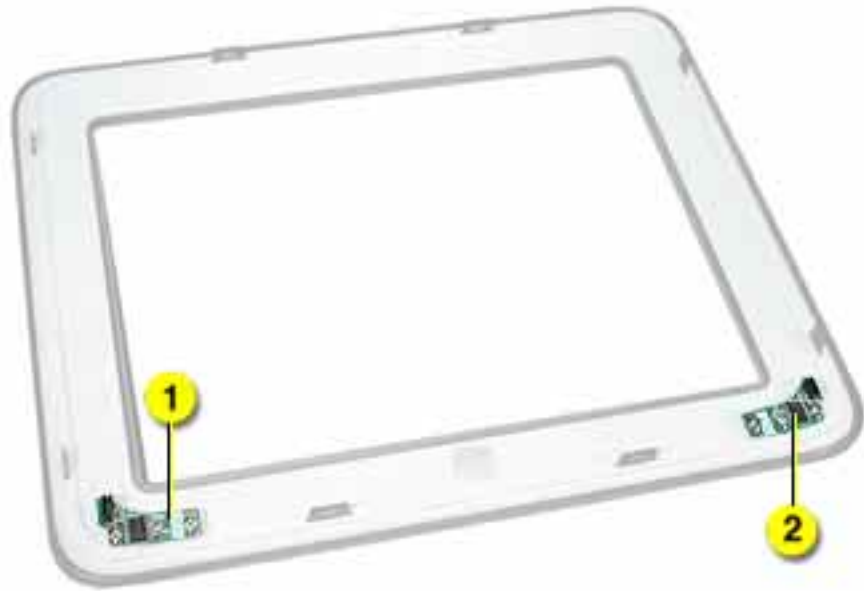
1. Use a small, plastic flat-blade screwdriver to disengage four plastic mounting tabs, and pull up to separate the bezel mount from the front bezel.



2. Remove two screws and the power button board (1) from the front bezel.



3. Remove two screws and the launch button board (2) from the bezel.



4. Remove the power button (1) and the launch button (2) from the front bezel.





Adjustments

Studio Display (17" CRT, 16" VIS,
ADC)

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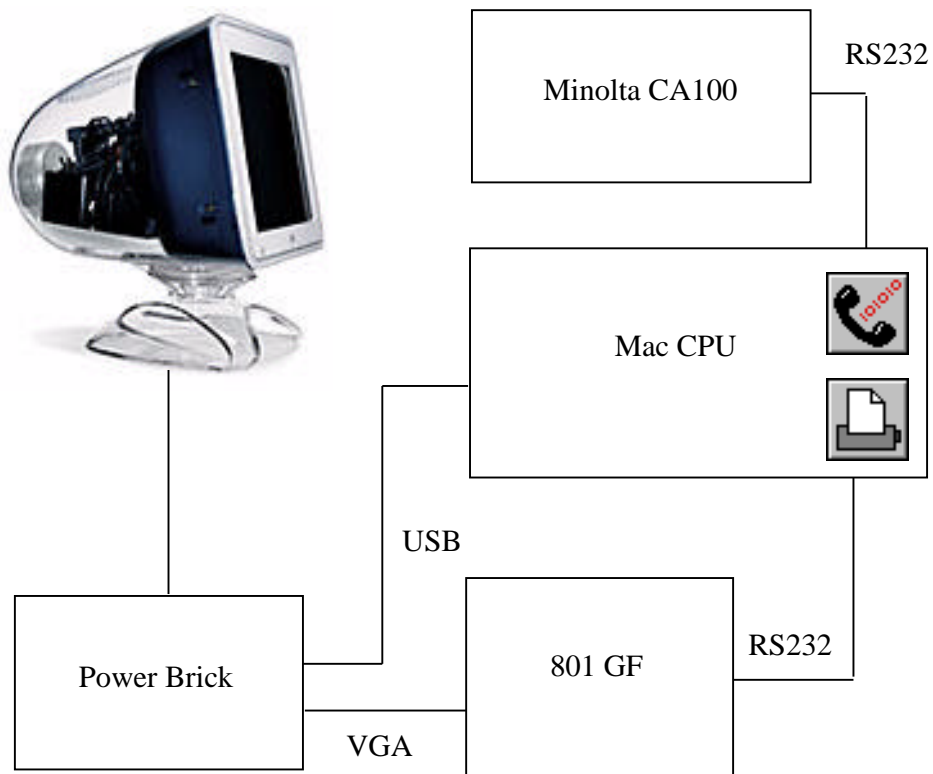
Introduction

This is the read-me file for the documentation of the Mac-based Cabernet rework (version 1.1) software. This documentation should be used in conjunction with the ADI Cabernet service manual. Refer to the appendix A for descriptions on the available software features and functions in this rework software.

Hardware Requirements

1. Power PC with PCI slot and serial ports.
2. ADS USB card.
3. Quantum 801GF with Mac serial cable connected to serial printer port.
4. Minolta CA100 with Mac serial cable connected to serial modem port.
5. 28V DC power brick with ADC to VGA/USB adapter board.
6. Multi-meter
7. Helmholtz cage.
8. Hand degausser.
9. Insulated alignment tools.

Hardware Setup



CA100 Equipment Setup

1. Check that the CA100 has been set to FL.
2. Check that the baud rate has been set to 2400.
3. Connect the DB25 connector of the serial cable to the CA100 RS232 terminal and the DIN 8 to the Mac serial modem port.
4. The Minolta color analyzer CA100 must be calibrated with a high accuracy colorimeter (e.g. LMT) or photometer for the following color temperature in the memory channels:
 - Channel 1 = 4100.
 - Channel 2 = 5000.
 - Channel 3 = 6500.
 - Channel 5 = 9300.
 - Channel 6 = Red.
 - Channel 7 = Green.
 - Channel 8 = Blue.

Software Requirements

1. Mac OS 8.6 or above.
2. USB card support drivers version 1.1 drivers or above.
3. Apple monitors (version 2.0.3) - Tobiko software.
4. Apple Mac Cabernet rework software.

Alignment Condition Requirements

1. Unit-under-test (UUT) must be in burn-in with full white pattern (generated from power brick when no external video signal is sensed) for a minimum of 30 minutes.
2. UUT must be properly degaussed before any alignment.
3. Alignment must be done in the helmholtz cage.

Alignment Procedures

Turning ON the unit

1. Click on “Preset & read” to ensure that the Cabernet can be found on the USB. Message should show “UUT found”, if not check the connection. Also ensure that the check box “Preset Contrast” is ticked.
2. Click on the button “UUT ON” to power ON the UUT. **Important note:** Must click on the button “UUT OFF” to power OFF the UUT after adjustment. Failure to click “UUT OFF” will result in higher power consumption in sleep mode and abnormal power ON operation (i.e. degauss activated before powering ON the Mac) when connected to a Mac CPU.

Data Upload

1. Equipment: Mac with USB.
2. Condition:
 - (a) UUT must be able to communicate through the USB.
3. Select [Rework>Factory Data>Upload All] to upload the EEPROM contents from a bad video board.
4. The EEPROM contents from the bad video will be stored in a factory data file format. The EEPROM data in this file can be transferred to the new video board by using the download function described next.
5. If the contents from the bad video board cannot be uploaded, then the alternative is to use the factory backup files available at Apple’s ftp site for Cabernet. The address for the ftp site will be made known later. Use the unit serial number to search for the unit’s factory backup file.

Data Download

1. Equipment: Mac with USB.
2. Condition:
 - (a) UUT must be able to communicate through the USB.
3. Select [Rework>Factory Data>Download All] to download the EEPROM contents from a video or a factory backup file to the new video board. Use this function to reduce the amount of adjustment needed after a change of the video board .by searching it using the UUT serial number.
4. Power OFF and ON the DC power supply to the UUT for the download EEPROM data to take effect.
5. Check through all the adjustments against the specifications to ensure that the downloaded EEPROM data work with the new video board.
6. Re-adjust when necessary.

B+ voltage check and adjustment

1. Equipment and adjustment procedure is the same as detailed in the service manual.
2. Condition:
 - (a) Timing mode is [1024x768@99Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1024x768@99Hz](#)]
 - (b) Pattern is White – select [Quantum Data>801 Patterns>White Page].

USB output voltage check

1. Equipment and checking procedure is the same as detailed in the service manual.

1V check and adjustment

1. Equipment and adjustment procedure is the same as detailed in the service manual.
2. Condition:
 - (a) Timing mode is [1024x768@99Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1024x768@99Hz](#)]
 - (b) Pattern is Raster – select [Quantum Data>801 Patterns>Raster].

Raster centering

1. Equipment is the same as detailed in the service manual.
2. Condition:
 - (a) Timing mode is [1024x768@99Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1024x768@99Hz](#)]
 - (b) Pattern is Green Frame – select [Quantum Data>801 Patterns>Green Frame].
3. In the color and convergence page, set the G cutoff to maximum at 0xFF to see the edge of the raster.
4. Adjustment procedure is the same as detailed in the service manual.

Regulation check and adjustment

1. Equipment and checking procedure is the same as detailed in the service manual.
2. Condition:
 - (a) Timing mode is [1024x768@99Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1024x768@99Hz](#)]
 - (b) Pattern is “Regulate” – select [Quantum Data>801 Patterns>Regulate].
3. Adjustment – use the “H EHT Comp” and “V EHT Comp” scroll bars in the color and convergence page to adjust the regulation.

CG check and adjustment

1. Equipment and adjustment procedure is the same as detailed in the service manual.
2. Condition:
 - (a) Timing mode is [1024x768@99Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1024x768@99Hz](#)]
 - (b) Pattern is X-Hatch White – select [Quantum Data>801 Patterns>X-Hatch White]. Use the RGB buttons on the 801GF for manual control over the color displayed.
 - (c) Ensure that the H/V static controls are at the default position 0x7F.

Focus check and adjustment

1. Equipment and adjustment procedure is the same as detailed in the service manual.
2. Condition:
 - (a) Timing mode is [1280x1024@75Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1280x1024@75Hz](#)]
 - (b) Pattern is Focus – select [Quantum Data>801 Patterns>Focus]+ [Quantum Data>801 Controls>Reverse]. After adjustment do [Quantum Data>801 Controls>Reverse].

Beam Landing check and adjustment

1. Equipment and adjustment procedure is the same as detailed in the service manual.
2. Condition:

(a) Timing mode is [1024x768@99Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1024x768@99Hz](#)]

(b) Pattern is Green Page – select [Quantum Data>801 Patterns>Green page].

Note: Prior to any alignment of the beam landing the UUT must be warm-up in a full white page at 15fl.

Geometry check and adjustment

1. Equipment and adjustment procedure is the same as detailed in the service manual.
2. Condition:
 - (a) Timing mode is all the seven timing formats from Cab_1 to Cab_7.
 - (b) Pattern is Green Frame – select [Quantum Data>801 Patterns>Green Frame].
3. If the geometry data was downloaded from the factory file or the original video board, check that the geometry for the 7 timing formats is within specifications. If not then start the geometry adjustment.
4. Adjustment – start with prime mode at timing Cab_3 format. Note: Mode independent parameters are in black in the Geometry page. Blue indicates mode dependent parameters – these must be aligned and checked at the different timing formats from Cab_1 to Cab_7. Do a “Read All” whenever there is a change of timing format, so as to get the actual parameter settings.
5. When geometry is within specifications in the Cab_3 format, click “Save user” then click “Do Prediction”. Prediction function is used to cut down the adjustment time for the rest of the timing formats. It is OK to skip the prediction function and proceed to the adjustment for next timing format, but just remember to click “Save user” before changing the timing format.
6. Check the geometry from timing formats Cab_1 to Cab_7 and touch-up if necessary. For formats that are within specifications click on “Save user” for each mode before changing the timing format.
7. When all the 7 timing formats are checked to be within specifications, click on “Save defaults” to save the settings into the factory EEPROM space.

White balance check and adjustment

1. Equipment: calibrated CA100.
2. Condition:
 - (a) Timing mode is [1024x768@99Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1024x768@99Hz](#)]
 - (b) Pattern for cutoff adjustment is GrayScale 16 – select [Quantum Data>801 Patterns>X-GrayScale 16].
 - (c) Pattern for white balance adjustment is VPT Page – select [Quantum Data>801 Patterns>VPT Page].
 - (d) Make sure the contrast is set at maximum 0x60.

3. Cutoff adjustment

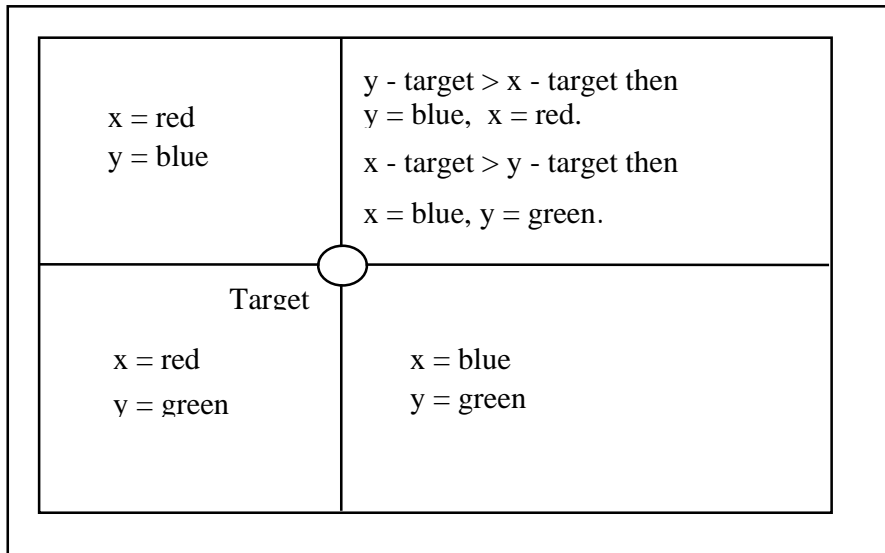
- (a) Set the pattern to “GrayScale 16”.
- (b) Check that the cutoff is at 2nd bar just slightly visible. If not then start the cutoff adjustment. Note: For better judgement of the 2nd bar use the reverse setting by selecting [Quantum Data>801 Controls>Reverse].
- (c) Adjustment - In the color page, click on “Preset Color”.
- (d) Use the scroll bar “RGB Cutoff” to adjust until the second gray bar just disappear or barely visible. Note: The “RGB Cutoff” control is a pseudo cutoff scroll bar control to ease the adjustment of R, G, B cutoff controls together – actual steps change will be reflected in the individual R, G, B cutoff scroll bars.

4. White balance check

- (a) Set the pattern to “VPT Page”.
- (b) Place and hold the CA100 probe in the center of the white page.
- (c) If the white balance data was downloaded from the factory file or the original video board, a check must be performed to ensure that the white balance is within high brightness specifications (contrast at max 0x60) of $x = 283 \pm 10$, $y = 298 \pm 10$, $Y = 33 \pm 3$, and low brightness specifications (adjust contrast to achieve $Y = 2.5 \pm 1$ FL) of $x = 283 \pm 10$, $y = 298 \pm 10$.
- (d) If white balance is not within specifications then perform the manual or auto white balance procedures.

5. Manual white balance alignment

- (e) Set the pattern to “VPT Page”.
- (f) Place and hold the CA100 probe in the center of the white page.
- (g) Adjust the contrast to achieve about 2.5 ± 1 fl.
- (h) Measure the low light color to determine whether the CRT is red, green or blue bias. Use the biasing template shown below to judge the biasing. CIE specifications for this product is at $x = 283$, $y = 298$.



- (i) With the CRT biasing determined, do not touch the cutoff for that color.
- (j) Use only two of the cutoffs that are indicated by the CRT color biasing template for the adjustment until the low color is within specs. If there is difficulty in getting the low color within specifications then move to high brightness color adjustment.
- (k) Specifications for the white balance adjustment is at 9300 - $x = 283 \pm 5$, $y = 298 \pm 5$, $Y = 33 \pm 1$
- (l) Set the contrast to maximum at 0x60.
- (m) For high light color adjustment use R Drive for CIE x adjustments, G Drive for CIE y adjustments. For brightness adjustment, use the R, G, B Drives and adjust them together.
- (n) Adjust the contrast to achieve about 2.5 ± 1 fl.
- (o) Check and adjust the low light color until it is within the specification.
- (p) Repeat steps (j) to (p) until the high and low color is within specifications.
- (q) To save the color settings click on the "Save" button.

5. Auto white balance alignment

- (a) Set the pattern to "VPT Page".
- (b) Initialize the CA100 by selecting [Minolta>Setup>Initialize CA100].
- (c) Check that the remote light on the CA100 is lighted.
- (d) To zero calibrate the probe select [Minolta>Setup>Zero Calibrate Probe].
- (e) Place and hold the CA100 probe in the center of the white page.
- (f) Select [Rework>White Balance>X-Align White Balance].
- (g) When the white balance adjustment pass, the message shown is: "Passed white balance adjustment".

VPT check and calibration

1. Equipment: calibrated CA100.
2. Condition:
 - (a) Timing mode is [1024x768@99Hz](#) – select [Quantum Data>801 Formats>Cab 3 = [1024x768@99Hz](#)].
 - (b) Pattern is "VPT Page" – select [Quantum Data>801 Patterns>VPT Page].
 - (c) Make sure the contrast is set at maximum 0x60.
3. VPT calibration check
 - (a) If the VPT data is downloaded from the factory file or original video board then Select [Rework>VPT Tests>Check Calibration].
 - (b) Select memory channel 5 of CA100 to measure 9300.
 - (c) Take the reading of the CA100 and compare with the reading display from the software.
 - (d) Pass the VPT calibration if the difference between the measured and calculated x, y readings are within ± 5 units (e.g. if CA100 measured $x = 285$ and $y = 300$ and the calculated $x = 283$, $y = 298$ then the VPT calibration check is a pass). If it failed then performed the VPT calibration process described next.

4. VPT calibration
 - (a) Select [Rework>VPT Tests>Download Constants].
 - (b) Check that CA100 is initialized and the remote light is ON.
 - (c) Select [Rework>VPT Tests>Perform VPT Characterization].
 - (d) When the calibration pass, the message shown is: “Color and VPT tests passed!”.

EDID Data Check

1. Equipment: Mac with USB.
2. Condition:
 - (a) Ensure that the UUT has completed VPT check or calibration process.
3. Select [Rework>EDID>Download Default Constants].
4. Select [Rework>EDID>Copy Magic Cookie].
5. Select [Rework>VPT Tests>Get Magic Cookie]. Note down the magic cookie number.
6. Select [Rework>EDID>Get EDID ID]. Ensure that the EDID ID number is the same as the magic cookie number.

Theater Mode Check

1. Equipment: Mac with USB, CA100, Quantum Data 801GF.
2. Condition:
 - (a) Completed white balance adjustment.
3. Select [Quantum Data>801 Patterns>5 Boxes]. Note: Make sure the background is black, if not just choose reverse option to set the background black.
4. Measure the brightness for the center box – say Y1 fl
5. In the color page click on the button “Bright Win ON”. Button should change to “Bright Win OFF”, which means the next click on the button will turn Bright Window mode OFF.
6. In the color page click on the button “Full Screen ON”. Button should change to “Full Screen OFF”, which means the next click on the button will turn Full Screen mode OFF.
7. Measure the brightness for the center box again – say Y2 fl
8. Pass the UUT if the Y2/Y1 brightness ratio is at least 1.4 times.
9. Click on the buttons to turn off the full screen mode first then the bright window mode.

Note: The “Vert Blnk DC” scroll bar should be at 0x8C and the “Delta DC Level” scroll bar should be at 0x03.

Bright Window Check

1. Equipment: Mac with USB, CA100, Quantum Data 801GF.
2. Condition: Completed white balance adjustment
 - (a) Completed white balance adjustment.
3. Select [Quantum Data>801 Patterns>Bright Window]. Note: Make sure the background is black, if not just choose reverse option to set the background black.
4. Measure the brightness for the center box – say Y1 fl
5. In the color page click on the button “Bright Win ON”.

6. Measure the brightness for the center box again – say Y2 fl
7. Pass the UUT if the Y2/Y1 brightness ratio is at least 1.4 times.
8. Turn off the bright window mode.

Note1: The “Vert Blnk DC” scroll bar should be at 0x8C and the “Delta DC Level” scroll bar should be at 0x03.

Note2: If the bright window mode did not work, check that the length of the video cable is not too long to cause any double image or power ON/OFF the DC power brick and try again.

Degauss Check

1. Equipment: Hand degausser.
2. Condition:
 - (a) Timing format can be any of Cab_1 to Cab_7.
 - (b) Pattern is “Red Page” – select [Quantum Data>801 Patterns>Red Page].
3. Magnetize the UUT using the hand degausser by press/ release shortly to magnetize the UUT at about 10cm away in the center of the screen. Screen should have some R, G, B color patches.
4. Click on the “Degauss” button. The UUT internal degauss should be activated and the screen should be just red without any color patches.
5. If the color patches remain then the degauss function is not working.

Turning OFF the UUT

When the UUT passes all the adjustments, click on the button “UUT OFF” and the UUT will just shutdown. **Important note:** Must click on the button “UUT OFF” to power OFF the UUT after adjustment. Failure to click “UUT OFF” will result in higher power consumption in sleep mode and abnormal power ON operation (i.e. degauss activated before powering ON the Mac) when connected to a Mac CPU.

APPENDIX A

Description of buttons functions in [Geometry] page

1. Preset & read – Preset default (max) Contrast setting and read the parameters values.
2. UUT ON/OFF – Turn ON or OFF the unit. If button shows “UUT OFF” it means that hitting the button “UUT OFF” will turn OFF the unit. Vice versa for “UUT ON”.
Note: UUT means “Unit-Under-Test”.
3. Load defaults – Load the factory aligned values.
4. Read ALL – Read all the alignment parameters values in the current page.
5. Degauss – Activate the built-in degauss function.
6. Save user – Save the current page’s parameters values into the user EEPROM.
7. Timing – Read what is the current vertical timing frequency of cab1, cab2,....
8. Save defaults – Save the current page’s parameters values into the factory EEPROM.
9. Do Prediction – Predict the other geometry modes parameters based on the alignment data stored in the Cab_3 timing ([1024x768@99Hz](#) prime mode) user EEPROM. Predicted values for the other timing mode parameters will be stored in the user EEPROM.
10. Degauss State – Check on the power ON degauss state – i.e. whether power ON degauss is enabled. Must be enabled.
11. File -> EE – Downloads the file contents (in simple text file format of [address data]) to the EEPROM.
12. EE -> file – Uploads the EEPROM data and stores the data in simple text file format. Use the check boxes [IVAD Data] or [VPT Data] to select the kind of upload data.

Description of buttons functions in [Color/Convergence] page

Note: Some buttons functions are the same as previous.

1. Save – Save all the current parameters values into user and factory EEPROM.
2. Preset Color – Set the R, G, B drives and cutoffs prior to cutoff and color alignment.
3. Get Hilks – Read the R, G, B high beam currents.
4. Get LoIks – Read the R, G, B low beam currents.
5. Bright Win ON/OFF – Activate/de-activate the bright window feature.
6. Full Screen ON/OFF – Activate/de-activate the theater mode feature. Must be used with bright window mode ON.

Description of menu functions

PROGRAM

1. “Program>Quit” – To quit the program.

Rework/ Get UUT Info

1. “Rework > Get UUT Info > ID number”- shows the production process ID number.
2. “Rework > Get UUT Info > Manufacture date”- shows the unit’s production date. This is created in production during the VPT calibration process.
3. “Rework > Get UUT Info > Service date”- shows the unit’s service date. This is created whenever there is any save to the UUT’s EEPROM.

Rework/ VPT Tests

1. “Rework > VPT Tests > Download Constants”- Downloads the VPT constants.
2. “Rework > VPT Tests > Check VPT calibration”- Check on the correctness of the VPT calibration using calculation based on the RGB characterization data. To be used with a white pattern setting.
3. “Rework > VPT Tests > Get Checksum Data”- To check if the RGB characterization data in the EEPROM is correct
4. “Rework > VPT Tests > Get Max RGB Ik”- Show what are the max RGB beam currents stored in the VPT EEPROM.
5. “Rework > VPT Tests > Get Magic cookie”- Show what is the unit’s unique ID. This unique ID must matched the unique ID stored in the EDID data.
6. “Rework > VPT Tests > Get Coulomb Counter”- Show what is the amount of aging the CRT has gone through. This is updated at about every 35mins interval.
7. “Rework > VPT Tests > Zero Coulomb Counter”- Reset the aging counters. Used only when set is serviced and it is also automatically zeroed during the VPT calibration process.
8. “Rework > VPT Tests > Perform VPT characterization”- Perform VPT calibration using a serially controlled CA100.

Rework/ White Balance

1. “Rework > White Balance > Align White Balance”- Perform the white balance adjustment using a serially controlled CA100.

Rework/ EDID

1. “Rework > EDID> Download Default Constants”- Downloads the default EDID constants.
2. “Rework > EDID> Copy Magic Cookie”- Copy the magic cookie number from VPT EEPROM to EDID data EEPROM.
3. “Rework > EDID> Get EDID ID”- Shows the magic cookie number that is stored in the EDID EEPROM. Must be the same as the number shown in the “Get Magic Cookie”.
4. “Rework > EDID> Upload EDID To File”- Uploads the EDID data and stores the data in simple text file format.

Rework/ Factory Data

1. "Rework > Factory Data > Upload All"- Uploads all the whole UUT EEPROM data and stores the data in the factory file format. Can be used to backup EEPROM data prior to changing of video board to minimize re-alignment
2. "Rework > Factory Data > Download All"- Downloads all the data stored in a valid factory file format and writes the data into the UUT EEPROM. Can be used during the repair process to transfer the UUT data into a new video board.
3. "Rework > Factory Data > Convert to Excel format"- Converts a UUT factory backup file to a excel readable format.
4. "Rework > Factory Data > Convert to Excel format"- Converts a UUT factory backup file to a simple text readable format.

Quantum Data

1. "Quantum Data > 801 Formats >"- For serial control of the Quantum 801 timing modes/ formats.
2. "Quantum Data > 801 Patterns >"- For serial control of the Quantum 801 patterns.
3. "Quantum Data > 801 Controls >"- For serial control of the Quantum 801 controls.

Minolta

1. "Minolta> Setup >"- For serial control of the CA100. Initialization and zero probe should be performed prior to the software white balance adjustment functions and VPT calibration functions.
2. "Minolta > Channel >"- For serial control of the CA100 channel selection.

APPENDIX B

Wiring diagram for CA100 and 801GF to Mac serial port

